ABSTRACT

Knitted fabrics are used in many different applications including inner wear, outer wear, sportswear, medical textiles, shoes etc. However the potential uses of knitted fabric in traditional clothing outerwear are still limited. This study is concerned with the properties of weft-knitted fabrics produced from conventional and compact cotton yarns. The properties namely spirality and wickability were studied as they represent the most important properties of knitted fabrics. The effects of gauge length on the properties of compact and conventional yarns were investigated. The strength distribution of both conventional and compact yarns was modeled by the two parameter Weibull type model. These yarns were used for the production of single jersey, rib and interlock with three loop lengths. They were subsequently subjected to scouring, bleaching, dyeing and bio polishing treatments. All the seventy two knitted samples were examined for wicking behaviour while the single jersey fabrics were tested for spirality. The dimensional properties of single jersey fabrics only were examined in finished state only. The weft knitted fabrics were tested for bursting strength and pilling for assessing the influence of finishing treatments on them.

Conventional and compact yarns were doubled by three methods, namely conventional-conventional, compact -compact and conventional –compact and their properties were examined. For this purpose, 50Ne compact and 50Ne conventional yarns were produced and they were used for producing doubled yarn by the three methods outlined above. With conventional and compact yarns three types of doubled yarn with five levels of twist factor were produced. All the fifteen yarn samples were examined for U%, imperfections, tenacity, elongation and hairiness.
It is shown that the compact yarns are superior to the conventional yarn in terms of tenacity and hairiness. Gauge length had a significant effect on tenacity of conventional and compact yarns. A good fit with a Weibull distribution was found for yarn strength and this allowed for accurate scaling of strength at different gauge length.

Spirality was measured by a new technique namely corel draw software. The correlation between software method and manual method was found to be good. Loop length, processing stages, methods of determining spirality and the type of yarns were the variables considered and each one had a significant effect on spirality.

Compact doubled yarn were found to have higher strength than those of conventional doubled yarn but the hybrid yarn also showed promising results at a certain twist factor. It is shown that this twist factor can be taken for producing doubled yarn economically.

Bursting strength values are well correlated with loop length, type of yarn and processing sequences. Hence the measurement of bursting strength is recommended in the knitting industry to detect any change in structure, the quality of yarn and wet processing sequence. It has been found to be a sensitive indicator of the performance of knitted fabrics.

It is shown that the wickability was found to be better in knitted fabrics made from compact yarns. The type of medium, loop length, processing treatments and knitted structures had a profound effect on wickability. The industrial implications of the study are fully discussed.